One sample t-test

Hypotheses: $H_0: \mu = \#$

$H_a: \mu \gtrless\neq \#$

test stat:

$$t = \frac{\bar{x} - \mu}{s/\sqrt{n}}$$

p-value:

$P(t \geq \underline{\text{test stat}} \mid df = n-1) =$

confidence interval:

$\bar{x} \pm t^* \cdot s/\sqrt{n} = (a, b)$

from table

Assumptions: Check

1) SRS

2) norm. pop.
or
$n \geq 30$

Calculator:

T-test

T-Interval

Matched Pairs t-test (one sample test)

* When? When we have 2 DEPENDENT samples that we want to combine (by subtracting) into 1 sample. After - Before

Hypotheses:

$H_0: \mu_d = \#$ (often 0)

$H_a: \mu_d \gtreqless \#$

Assumptions:

1) SRS
2) norm. pop. of differences or $n_d \geq 30$

test stat:

$$t = \frac{\bar{x}_d - \mu_d}{s_d/\sqrt{n_d}}$$

p-value:

same

Calculator:

T-test
T-Int.

confidence interval: ~~the~~ Interpret:

$$\bar{x}_d \pm t^* \cdot s_d/\sqrt{n_d}$$

... that the mean diff. of ___ is btw. a & b.

Two sample t-test

Hypotheses: $H_0: \mu_1 = \mu_2$

$H_a: \mu_1 \gtreqless \mu_2$

Assumptions:

1) 2 indep. SRS

2) 2 normal pop.
or
n_1 and $n_2 \geq 30$

test stat:

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

Calculator:

p-value:

$P(t \gtrless \_\_\_\_ \mid df = \text{on calc.}) = \text{tcdf}(LB, UB, df)$

or smaller of $n_1 - 1$
$n_2 - 1$

confidence interval & interpretation:

$$(\bar{x}_1 - \bar{x}_2) \pm t^* \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}} = (a, b)$$

We are ___ % conf that the diff. btw. the means of #1 & #2 is btw a and b. *O

Two sample t-test pooled□

when? when $\sigma_1 = \sigma_2$ (pop. std. dev.)

What is sp? pooled std. dev.

on calc. pooled estimator of σ

test stat:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{S_p\sqrt{\frac{1}{n_1}+\frac{1}{n_2}}}$$

confidence interval:

$$(\bar{X}_1 - \bar{X}_2) \pm t^* S_p\sqrt{\frac{1}{n_1}+\frac{1}{n_2}}$$

$df = n_1 + n_2 - 2$ (on calc.)

Assumptions: check

1)

2)

3) $\sigma_1 = \sigma_2$ ① stated/ $S_1 \approx S_2$

Calculator:

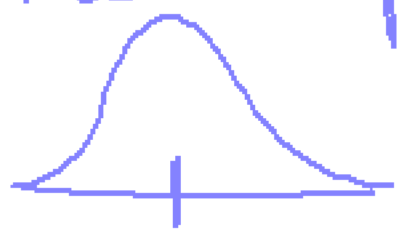
Pooled $\boxed{\text{YES}}$

t

* unknown σ
  estimate w/ s
- df
- t-distribution
  $N(0, ?)$
  depends on df/n
- t wider than z
- as $n \uparrow$, t become closer to z

Sim

- t with df $= \infty$,
  $t = z$
- normal shape



0

- testing means

z

- known σ
- Std. Normal Distr.
  $N(0,1)$